

# Sample Paper 02

## Class - 10th Exam - 2024 - 25

### Mathematics - Standard

Time : 3 Hours

Max. Marks : 80

#### General Instructions :

1. This question paper contains 38 questions.
2. This Question Paper is divided into 5 Sections A, B, C, D and E.
3. In Section A, Questions no. 1-18 are multiple choice questions (MCQs) and questions no. 19 and 20 are Assertion - Reason based questions of 1 mark each.
4. In Section B, Questions no. 21-25 are very short answer (VSA) type questions, carrying 02 marks each.
5. In Section C, Questions no. 26-31 are short answer (SA) type questions, carrying 03 marks each.
6. In Section D, Questions no. 32-35 are long answer (LA) type questions, carrying 05 marks each.
7. In Section E, Questions no. 36-38 are case study based questions carrying 4 marks each with sub parts of the values of 1, 1 and 2 marks each respectively.
8. All Questions are compulsory. However, an internal choice in 2 Question of Section B, 2 Questions of Section C and 2 Questions of Section D has been provided. An internal choice has been provided in all the 2 marks questions of Section E.
9. Draw neat and clean figures wherever required.
10. Take  $\pi = \frac{22}{7}$  wherever required if not stated.
11. Use of calculators is not allowed.

## Section - A

Section A consists of 20 questions of 1 mark each.

1. If  $\alpha$  and  $\beta$  are the roots of  $ax^2 - bx + c = 0$  ( $a \neq 0$ ), then value of  $\alpha + \beta$  is
  - (a)  $\frac{b}{a}$
  - (b)  $\frac{a}{b}$
  - (c)  $\frac{2a}{b}$
  - (d)  $\frac{a}{2b}$
2. What are the values of  $x$  and  $y$  for the following pair of linear equations ?  
 $99x + 101y = 499$  and  $101x + 99y = 501$ 
  - (a) 3 and 6
  - (b) 3 and 2
  - (c) 2 and 3
  - (d) 6 and 3
3. The zeroes of polynomial  $p(x) = ax^2 + bx + c$  are reciprocal of each other if
  - (a)  $b = 2a$
  - (b)  $c = b$
  - (c)  $b = a$
  - (d)  $c = a$
4. If  $-1$  is a zero of the polynomial  $p(x) = kx^2 - 4x + k$ , the value of  $k$  is
  - (a)  $-4$
  - (b)  $-2$
  - (c)  $2$
  - (d)  $4$

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5. If a number  $x$  is chosen at random from the numbers  $-3, -2, -1, 0, 1, 2, 3$ , then What is the probability of  $x^2 < 4$  ?
- (a)  $\frac{4}{7}$  (b)  $\frac{3}{7}$   
(c)  $\frac{1}{7}$  (d)  $\frac{2}{7}$
6. Which of the following value of  $k$  should be selected so that the pair of equations  $x + 2y = 5$  and  $3x + ky + 15 = 0$  has a unique solution ?
- (a)  $k \neq 5$  (b)  $k \neq 6$   
(c)  $k = 5$  (d)  $k = 6$
7. The quadratic equation  $x^2 + 3x + 2\sqrt{2} = 0$  has
- (a) two distinct real roots (b) two equal real roots  
(c) no real roots (d) more than 2 real roots
8. A ladder 10 m long reaches a window 8 m above the ground. The distance of the foot of the ladder from the base of the wall is ..... m.
- (a) 8 m (b) 2 m  
(c) 6 m (d) 4 m
9. The value of  $x$  for which  $2x, (x + 10)$  and  $(3x + 2)$  are the three consecutive terms of an AP, is
- (a) 6 (b)  $-6$   
(c) 18 (d)  $-18$
10. If points  $A(-3, 12), B(7, 6)$  and  $C(x, 9)$  are collinear, then the value of  $x$  is ..... .
- (a) 2 (b) 3  
(c) 4 (d) 5
11. If the sum of the circumferences of two circles with radii  $R_1$  and  $R_2$  is equal to the circumference of a circle of radius  $R$ , then
- (a)  $R_1 + R_2 = R$  (b)  $R_1 + R_2 > R$   
(c)  $R_1 + R_2 > R$  (d)  $R_1 + R_2 < R$
12. The value of  $\sin^2 41^\circ + \sin^2 49^\circ$  will be
- (a) 1 (b)  $\sqrt{2}$   
(c) 2 (d)  $\sqrt{3}$
13. The number  $\frac{7}{75}$  will have -
- (a) non-terminating repeating decimal expansion.  
(b) terminating decimal expansion.  
(c) non-terminating non repeating decimal expansion.  
(d) terminating non repeating decimal expansion



14. A tree casts a shadow 15 m long on the level of ground, when the angle of elevation of the sun is  $45^\circ$ . The height of a tree is  
(a) 10 m (b) 14 m  
(c) 8 m (d) 15 m
15. The famous mathematician associated with finding the sum of the first 100 natural numbers is  
(a) Pythagoras (b) Newton  
(c) Gauss (d) Euclid
16. If the perimeter of one face of a cube is 20 cm, then its surface area is  
(a)  $120 \text{ cm}^2$  (b)  $150 \text{ cm}^2$   
(c)  $125 \text{ cm}^2$  (d)  $400 \text{ cm}^2$
17.  $\sin^2 60^\circ - 2 \tan 45^\circ - \cos^2 30^\circ = ?$   
(a) 2 (b) -2  
(c) 1 (d) -1
18. If  $x_i$ 's are the mid-points of the class intervals of grouped data,  $f_i$ 's are the corresponding frequencies and  $\bar{x}$  is the mean, then  $\sum (f_i x_i - \bar{x})$  is equal to  
(a) 0 (b) -1  
(c) 1 (d) 2
19. **Assertion :** The two tangents are drawn to a circle from an external point, then they subtend equal angles at the centre.  
**Reason :** A parallelogram circumscribing a circle is a rhombus.  
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).  
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).  
(c) Assertion (A) is true but reason (R) is false.  
(d) Assertion (A) is false but reason (R) is true.
20. **Assertion :** The values of  $x$  are  $-\frac{a}{2}$ ,  $a$  for a quadratic equation  $2x^2 + ax - a^2 = 0$ .  
**Reason :** For quadratic equation  $ax^2 + bx + c = 0$   
$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
  
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).  
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).  
(c) Assertion (A) is true but reason (R) is false.  
(d) Assertion (A) is false but reason (R) is true.



## Section - B

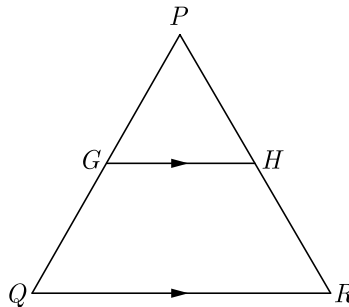
**Section B consists of 5 questions of 2 marks each.**

21. The mid-point of the line-segment  $AB$  is  $P(0, 4)$ , if the coordinates of  $B$  are  $(-2, 3)$  then find the coordinates of  $A$ .
22. Two different dice are tossed together. Find the probability :
- that the number on each die is even.
  - that the sum of numbers appearing on the two dice is 5.
23. Given that  $\text{HCF}(306, 1314) = 18$ . Find  $\text{LCM}(306, 1314)$ .
24. If  $\alpha$  and  $\beta$  are the zeroes of a polynomial  $x^2 - 4\sqrt{3}x + 3$ , then find the value of  $\alpha + \beta - \alpha\beta$ .

**OR**

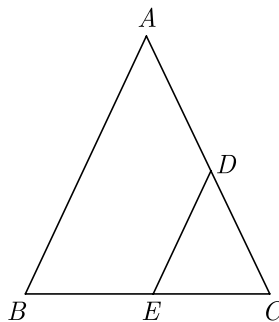
If one of the zeroes of the quadratic polynomial  $f(x) = 14x^2 - 42k^2x - 9$  is negative of the other, find the value of ' $k$ '.

25. In the given figure,  $G$  is the mid-point of the side  $PQ$  of  $\Delta PQR$  and  $GH \parallel QR$ . Prove that  $H$  is the mid-point of the side  $PR$  or the triangle  $PQR$ .



**OR**

In the figure of  $\Delta ABC$ , the points  $D$  and  $E$  are on the sides  $CA, CB$  respectively such that  $DE \parallel AB$ ,  $AD = 2x, DC = x + 3, BE = 2x - 1$  and  $CE = x$ . Then, find  $x$ .



## Section - C

**Section C consists of 6 questions of 3 marks each.**

26. Evaluate :  

$$\frac{3 \tan^2 30^\circ + \tan^2 60^\circ + \operatorname{cosec} 30^\circ - \tan 45^\circ}{\cot^2 45^\circ}$$
27. Prove that the rectangle circumscribing a circle is a square.
28. A solid is in the shape of a cone surmounted on a hemisphere. The radius of each of them being 3.5 cm and the total height of the solid is 9.5 cm. Find the volume of the solid.

**OR**

A heap of rice is in the form of a cone of base diameter 24 m and height 3.5 m. Find the volume of the rice. How much canvas cloth is required to just cover the heap?

29. Write the smallest number which is divisible by both 306 and 657.
30. The mean of the following distribution is 48 and sum of all the frequency is 50. Find the missing frequencies  $x$  and  $y$ .

Class	20-30	30-40	40-50	50-60	60-70
Frequency	8	6	$x$	11	$y$

**OR**

The table below shows the daily expenditure on food of 25 households in a locality. Find the mean daily expenditure on food.

Daily expenditure (in <)	100-150	150-200	200-250	250-300	300-350
Number of households	4	5	12	2	2

31.  $\triangle ABC$  and  $\triangle BDE$  are two equilateral triangle such that  $D$  is the mid-point of  $BC$ . Ratio of the areas of triangles  $ABC$  and  $BDE$  is .....

## Section - D

**Section D consists of 4 questions of 5 marks each.**

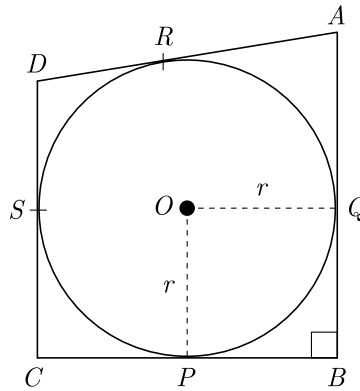
32. Prove that the point  $(3,0)$ ,  $(6,4)$  and  $(-1,3)$  are the vertices of a right angled isosceles triangle.
33. Find the values of  $k$  for which the equation  $(3k + 1)x^2 + 2(k + 1)x + 1$  has equal roots. Also find the roots.

**OR**

A person on tour has <4200 for his expenses. If he extends his tour for 3 days, he has to cut down his daily expenses by < 70. Find the original duration of the tour.



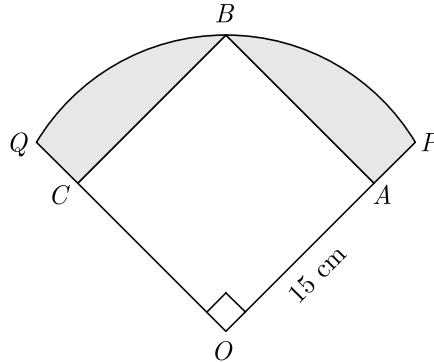
34. In figure, a circle with centre  $O$  is inscribed in a quadrilateral  $ABCD$  such that, it touches the sides  $BC$ ,  $AB$ ,  $AD$  and  $CD$  at points  $P, Q, R$  and  $S$  respectively. If  $AB = 29$  cm,  $AD = 23$  cm,  $\angle B = 90^\circ$  and  $DS = 5$  cm, then find the radius of the circle (in cm).



OR

Prove that opposite sides of a quadrilateral circumscribing a circle subtend supplementary angles at the centre of the circle.

35. In Figure, a square  $OABC$  is inscribed in a quadrant  $OPBQ$ . If  $OA = 15$  cm, find the area of the shaded region. (Use  $\pi = 3.14$ ).



## Section - E

Section E consists of 3 case study based questions of 4 marks each.

36. **Eiffel Tower** : The Eiffel Tower is a landmark and an early example of wrought-iron construction on a gigantic scale. The lower section consists of four immense arched legs set on masonry piers. The legs curve inward until they unite in a single tapered tower. Platforms, each with an observation deck, are at three levels; on the first is also a restaurant. The tower, constructed of about 7000 tons of iron, has stairs and elevators. A meteorological station, a radio communications station, and a television transmission antenna, as well as a suite of rooms that were used by Eiffel are located near the top of the tower.





- (i) For a person standing 324 m from the center of the base of the Eiffel Tower, the angle of elevation to the top of the tower is  $45^\circ$ . How tall is the Eiffel Tower?
- (ii) A car is moving at uniform speed towards the Eiffel tower. It takes 15 minutes for the angle of depression from the top of tower to the car to change from  $30^\circ$  to  $60^\circ$ . After how much time after this, the car will reach the base of the tower?
37. Bequests to Charity : At the time our mother left this Earth, she gave ₹ 90000 to her children of birth. This we kept and each year added ₹ 30000 more, as a lasting memorial from the children she bore. When ₹ 4,20,000 is thusly attained, all goes to charity that her memory be maintained.
- (i) What was the balance in the sixth year?
- (ii) In what year was the goal of ₹ 420,000 met?

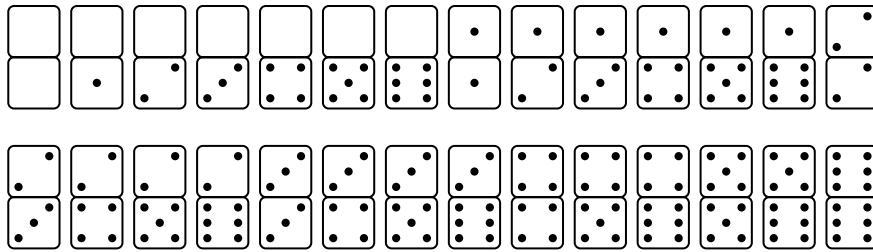


38. Double-six Dominos : It is a game played with the 28 numbered tiles shown in the diagram.



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The 28 dominos are placed in a bag, shuffled, and then one domino is randomly drawn. Give the following answer.

- (i) What is the probability the total number of dots on the domino is three or less ?
- (ii) What is the probability the total number of dots on the domino is greater than three ?
- (iii) What is the probability the total number of dots on the domino does not have a blank half ?
- (iv) What is the probability the total number of dots on the domino is not a “double” (both sides the same) ?

□□□□□□

